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# Important aspects of novel coronavirus. COVID-19 and impact of social distancing and lockdown on its spread in India: A brief overview

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**Abstract**
COVID-19 a Novel Coronavirus disease which emerged in the month of December 2019 in the city of Wuhan, China had crossed almost all previous records of acute respiratory disease syndromes and is still spreading at a brisk pace. The disease had already spread to the other parts of world and the number of infected cases is rising day by day. It is still early days to estimate the loss of lives and the economic impact of this deadly disease. Herein, we present little insight into different aspects like epidemiological, clinical, pathogenecity, transmissibility, genomics, diagnosis, prevention and treatment of the disease. Besides this a brief insight into the approach of India in combating the spread of COVID-19 through lockdown is also given.

**Keywords:** COVID-19, novel coronavirus, Wuhan, China, virus, genomics

## Introduction

Wuhan, the city which is believed to be the epicenter of one of the most deadly epidemics of the modern times is the commercial center of Hubei province. Things have changed a lot for the people who are residing there after the outbreak of a novel Coronavirus disease (COVID-19) in the month of December 2019 [1-2]. It is third in the series of Coronivruses which have cross-infected human populations in the past decade or so. The previous two in that series were, Severe Acute Respiratory Syndrome Coronavirus, (SARS-CoV) and Middle East Respiratory Syndrome Coronavirus, (MERS-CoV) which out broke in 2002 and 2012 respectively [3]. COVID-19 is a novel bacteriocoronavirus which comes under coronaviridae family. Its genome sequence resembles to bat SARS-CoV, CoVZXC21 (89%) and to human SARS-CoV (82%) giving an insight that the transmission maybe through bat or similar host [4]. COVID-19 has become an epidemic already, companies like Health map (Boston children's hospital USA), Blue Dot (Canadian based company) are monitoring and have provided informal epidemiological data of COVID-19. The data provided by these agencies and world health organization which is also monitoring COVID-19 is worrisome both for the scientists and the public as well [5]. Less information about the different aspects of the disease, limited disease specific symptoms and its resemblance to influenza makes it more difficult for the prevention of the COVID-19.

## Epidemiology and clinical aspects

In the month of December 2019 a Novel Coronavirus was found in the patients who were suffering from viral Pneumonia in the city of Wuhan, Hubei province, mainland China and in no time it became epidemic and spread to different cities of mainland china and other parts of the world. The virus species was named as 2019-nCoV by WHO, however the name was changed on 11 FEB 2020, as Coronavirus disease 2019 (COVID-19) [6]. As of now 17 November 2020, 53766728 cases are confirmed globally out of which 92428 cases are confirmed in mainland china which was the epicenter of the outbreak 53674300 are from the other parts of the world. China being the epicenter of the outbreak had been quite successful in controlling the widespread of the disease. United states of America have found it hard to control the spread of the disease and is the most affected country by far with 10641431 confirmed cases and number of deaths is also high as much as 242542 deaths have been reported so far while 1308975 deaths have been reported globally. India with a huge population is the most affected country outside USA with 8814579 cases confirmed and

129635 deaths reported so far [7]. A study done on Japanese citizens from 29 to 21 January 2020 where a total of 565 citizens which were evacuated from Wuhan were screened for COVID-19, 9.2% ascertainment rate of the infection was estimated with 95% confidence [8].

Clinically patients with COVID-19 are characterized by fever, chest tightness, shortness of breath and dry cough [9]. Patients in severe conditions have respiratory distress with respiration rate greater than or equal to 30/min, there resting oxygen saturation is lesser than or equal to 93% and arterial blood oxygen partial pressure lesser than or equal to 300mm Hg. In critical cases respiratory failure, shock which leads to multiple organ failure in most of the cases is observed [10].

## Pathogenecity, transmissibility and genomics

COVID-19 belongs to Sarbecovirus subgenus of Coronaviridae family. There are seven species of Coronavirus which have been identified so far SARS-CoV, MERS-CoV and SARS-CoV2 are the more dangerous ones while as serotypes 229E, OC43, NL63 and HKv1 are harmless. Severe acute respiratory syndrome Coronavirus (SARS-CoV) was the first one in the series and originated in Guangdong province of southern china during November 2002. Fever, headache, myalgia, chills, dry cough, respiratory distress and dyspnea where shown by infected individuals [11]. The disease spread to other parts of the globe as well with most of the countries from Asia, as many as 37 countries were affected. The case fatality rate (CFR) was reported as 9% with the number of deaths as 775 from the 8273 cases reported [12]. Middle East Respiratory Syndrome (MERS-CoV) originated in Jeddah, Saudi Arabia in the year of 2012. Clinical manifestations are more or less similar with the SARS-CoV, fever, headache, myalgia, cough chills, respiratory distress with pneumonia, septic shock and renal failure were observed in the infected persons [13]. Like SARS-CoV this also spread to other countries affected individuals in 27 countries. The CFR for MERS-CoV is 34.4% till November 2019 with the number of deaths as 858 from the 2494 cases reported [14]. SARS-CoV2 currently known as COVID-19 originated in the city of Wuhan, Hubei province, China. Symptoms are somewhat similar to SARS-CoV however in case of COVID-19 fever, cough and respiratory distress is found in the most cases [15]. Viral pneumonia has been confirmed in almost every person who got affected by this virus. 33% individuals developed acute respiratory distress syndrome (ARDS) and 14.6% patients i.e. 6 individuals died among the first 41 cases which have been reported [16]. High viral load with difficulty in breathing are the symptoms which are found in the most cases and differentiate it from other viral diseases. However, the current trend has shown a bit decline in the number of deaths with total number of deaths confirmed as 1308975 reducing it to 2.43% among 53766728 disease confirmed cases which is low in comparison to other SARS related diseases however the cause of concern here is the rapid growth and spread of COVID-19 in comparison to other SARS related diseases.

Transmission and outbreak of the COVID-19 started from a sea food market in Wuhan, like other respiratory viral diseases, MERS and SARS the outbreak of the disease was observed in winter. In the initial reports it was not evident whether human to human transmission exists or not however further reports have shown human to human transmission of the disease, this has led to the large spread of the disease in spite of the immediate course of action taken by Chinese government [17]. To determine the transmissibility of COVID-19, $R_0$ which is the number of individuals which can get infected from a single contagious individual was calculated and was reported as 1.4-2.5 in WHO's statement regarding COVID-19 on 23 Jan 2020. There are three possibilities for $R_0$, if $R_0$ is lesser than 1 the disease less than 1 individual will be infected from each infected person and eventually the disease will die, If $R_0$ is equal to 1 the disease will be stable and alive for long with no outbreak and if $R_0$ is greater than 1 which is the case in COVID-19 it is epidemic or even pandemic. Other estimates show the $R_0$ value to be 3.3-5.5 which is quite alarming [18].

Coronavirus is a complex pathogen and can infect multiple host species. It comes under the positive sense category of the RNA viruses, club-like spikes projecting from its surface is one of the chief characterizations of Coronavirus [19]. In-depth genome annotation which was performed using the data acquired from first three genomes of COVID-19 and related Coronaviruses (Human SARS-CoV, Bats SARS like CoV and Human MERS-CoV) showed that these strains are identical to the most part, the difference lies in the genome of approximately 29.8kb (difference of five nucleotide). The genome annotation of COVID-19 further showed the presence of 14 ORFs (open reading frame) encoding 27 proteins. However at amino acid level there are similarities as well as some notable differences between COVID-19 and SARS-CoV. The difference lies in 3b, 8a and 8b proteins (8a is present in SARS-CoV and absent in COVID-19, 3b is longer 154 amino acids in SARS-CoV and shorter in COVID-19 only 22 amino acids long, 8b is shorter 84 amino acids long in SARS-CoV and longer 121 amino acids in COVID-19) [20].

## Diagnosis, treatment and prevention

Diagnosis include the clinical manifestations fever, fatigue, dry cough in the most cases and respiratory distress which worsens in the case of patients with acute illness as symptoms and RT-PCR (reverse transcription polymerase chain reaction) technique for genetic sequencing in which the respiratory swab or blood samples from patients are used to confirm positive or negative for COVID-19 [21]. Radiology has shown mostly bilateral ground-glass opacities upon chest imaging of the patients with COVID-19. Treatment is still illusive for COVID-19 so far symptomatic treatment has been given. Respiratory and circulatory support is provided in critical cases, therapeutics which have been used so far are antiviral therapeutics (interferon-α, lopinavir/litonavir), antibiotics, arbidol, oseltamivir, glucocorticoids and other anti-influenza drugs can be used in case of those patients which are co-infected [23-26]. In-vitro Studies have proven that remdesvir and chloroquine drugs as effective agents in controlling COVID-19 [27]. These two drugs i.e. remdesesvir and chloroquine along with hydroxychloroquine are already shown good results in patients.

Prevention is always better than cure as is the case with COVID-19. Though different vaccines have been prepared and some of them are almost on the verge of hitting the market soon, but these are still early days for the development of any permanent cure for COVID-19 and prevention of the spread of the disease is the only way out for now, some of the preventive measures which need to be done to protect ourselves and to restrict further spread of the virus are [28-29]:

1. Isolation of the individuals who are already infected by COVID-19.
2. Those who have come in close contact of the infected persons should be monitored for the symptoms.

3. Contact with those who are suffering from respiratory distress should be avoided.
4. Washing of hands especially after going to restroom or after a direct contact with sick people.
5. Contact with wildlife or any other farm animals should be avoided.
6. People should provide good example of their etiquettes by not coughing in public or by not doing it in an unprotected way.
7. Use of public transport in the affected areas should be limited.
8. People who are infected should ensure that they stay at home and those who are not infected should restrict their outdoor movement also.

**Impact of social distancing and lockdown on COVID-19 spread in India**
Timely lockdown and social distancing has helped India a lot in combating COVID-19 given the enormous size of population, the resources and medical facilities India possess. If we compare the stats and look at the number of days it took from first 100 (107 precisely) [30] confirmed cases in India to the 39980 number of cases as on May 08 2020 [31]. It took India 49 days to reach these figures whereas similar stats for USA which is the most affected country by this disease show that it took them just 20 days to reach the current figures of India, after initial 100 (108 precisely) confirmed [32, 33] cases. However the fact that US has done far more tests than India cannot be neglected here neither can be neglected the fact that immediate and complete lockdown had helped India in restricting the number of cases and community transfer to a larger extent. COVID-19 stats of India as represented in table 1 clearly depicts how there was a multifold increase in the number of confirmed cases and reported deaths. India at the end of lockdown was on the 7th number in the number of confirmed cases among all countries throughout the globe and its share was 3.15% to the global count which has increased to 16.39% as of now and it is on the 2nd number on the leader board. Japan unlike other countries which enforced lockdown, has not enforced lockdown but has done rapid testing and the success rate in combating COVID-19 is unbelievable. However as already said the size of population and the resources India have, lockdown has been a sigh of relief for authorities as well as the people in combating the spread of COVID-19.

**Table 1:** COVID-19 stats of India before and after lockdown

| COVID-19 stats of India at the end of lockdown | | | | | | COVID-19 stats of India as on 17/11/2020 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Total no. of confirmed cases in India | Total no. of deaths reported in India | Total no. of confirmed cases Globally | Total no. of deaths reported Globally | Confirmed cases share in the world (%) | Death share in the world (%) | Total no. of confirmed cases in India | Total no. of deaths reported in India | Total no. of confirmed cases Globally | Total no. of deaths reporter Globally | Confirmed cases share in the world (%) | Death share in the world (%) |
| 190535 | 5394 | 6057853 | 371166 | 3.15 | 1.45 | 8814579 | 129635 | 53766728 | 1308975 | 16.39 | 9.9 |

**Conclusion**
COVID-19 is new in the progression of Coronaviruses which have already affected human population worldwide. Unlike previous ones this one has spread and is still spreading briskly, unpreparedness for these types of diseases both globally as well as individually is clearly visible which has led to the rapid growth of this disease. Government and health agencies at their level should emphasize on the awareness of the people for these types of diseases, at individual level care should be taken not to get infected and not to infect others if infected with such type of transmitted diseases. Mini lockdowns and minimal social gathering can help a lot in restricting the spread of virus to the masses.

**Conflict of interest**
The authors declare that they have no conflict of interest.

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